2 PLANNING FOR CANALIZATION

The basic objective in developing a design for a canalized waterway is to provide facilities to meet projected future shipping needs in the most economical way consistent with protection and enhancement of social and environmental resources throughout the useful life of a project, (project life). Project life for navigation work in the United States is usually taken as 50 years.

Investigations to determine if a project can handle projected future transportation equipment and tonnage efficiently and safely include:

a. Economic studies relating to the amount and type of traffic that would use the new waterway, including:

- Projections of commodities that would move on the new waterway. What commodities would move? In what amount (annual tonnage)? From what origin, and to what destination? In what season would they move? Is there return traffic?
- Estimates of transportation benefits (savings) and intangible effects related to use of the waterway.
- Estimates of effects of the project on economic development of the region.

b. Evaluation of existing streams, including:

- Flood magnitude and frequency.
- Channel widths and depths at different seasons of year.
- Channel radii in bends at different seasons of year.
- Water quality.
- Sediment load.
- Bank erosion.
- Existing transportation facilities.
- Existing and planned river crossings (highways, railroads, pipelines, power lines).
- Existing and planned industrial development.
- Existing and planned port facilities.
- Important habitat areas and other environmental resources.

c. Evaluation of navigation equipment.

- Type, size, and draft of navigation equipment (towboats, barges, vessels) currently using the waterway or connecting channels.
- Projected types and size of equipment likely to use the waterway in the future.

d. Physical constraints on a canalization project.

- Are there any geographic or geological features along the river that are likely to make canalization clearly infeasible?

- Is streamflow augmentation needed? Is it feasible? (Are there upstream reservoir sites that can be developed for storage and low-flow augmentation?)
- Is there need for rectification and stabilization of the river to develop adequate navigable depths and widths?

e. What is optimum lock size for projected traffic and navigation equipment? Number of lock transits required annually throughout the project life to meet needs of shippers?

f. Is a single lock, or multiple locks, most economically efficient for handling projected traffic at each lock site?

The views of towboat captains who will use the waterway and the U.S. Coast Guard are requested with regard to channel dimensions and lock layout. The U.S. Coast Guard is responsible for navigation safety and navigation aids, such as channel lights and marking buoys, on inland waterways in the United States.

Size of tows using the inland waterways in the U. S. varies widely. Representative tow sizes for some waterways are summarized as follows:

a. Mississippi River.

- Upper Mississippi River (canalized). Standard tow size is 15 barges, in a configuration three barges wide and five barges long, Figures 2.1 and 2.2. Towboats have 3200 to 6000 horsepower.
- Middle Mississippi River (open-river). For downbound traffic, standard tow size is 25 barges, in a configuration five barges wide and five barges long. For upbound traffic, standard tow size is 30 barges, in a configuration five barges wide and six barges long. Towboats have 5600 to 6000 horsepower.
- Lower Mississippi River (open-river). For downbound traffic, standard tow size is 30 to 35 loaded barges. For upbound traffic, tow size ranges from 30 to 45 barges depending on river conditions and the mix of loaded and empty barges in the tow, Figure 2.3. Towboats have from 5600 to 10,500 horsepower.

b. Arkansas River (canalized). Standard tow size is eight barges, in a configuration three barges and three barges long, with the towboat occupying the middle slot in the last row of barges. Maximum tow size is 17 barges in a three barge wide by six barge configuration, with the towboat occupying the middle slot in the last row. Overall tow length is limited to 1200 ft because of the tight (small) radii of some bends.

c. Missouri River (open-river). Above Kansas City, standard tow size is three or four barges, in a configuration two barges wide and two long, and maximum tow size is six barges, in a configuration two barges wide and three long. Below Kansas City, standard tow size is six to nine loaded barges and 12 empty barges.

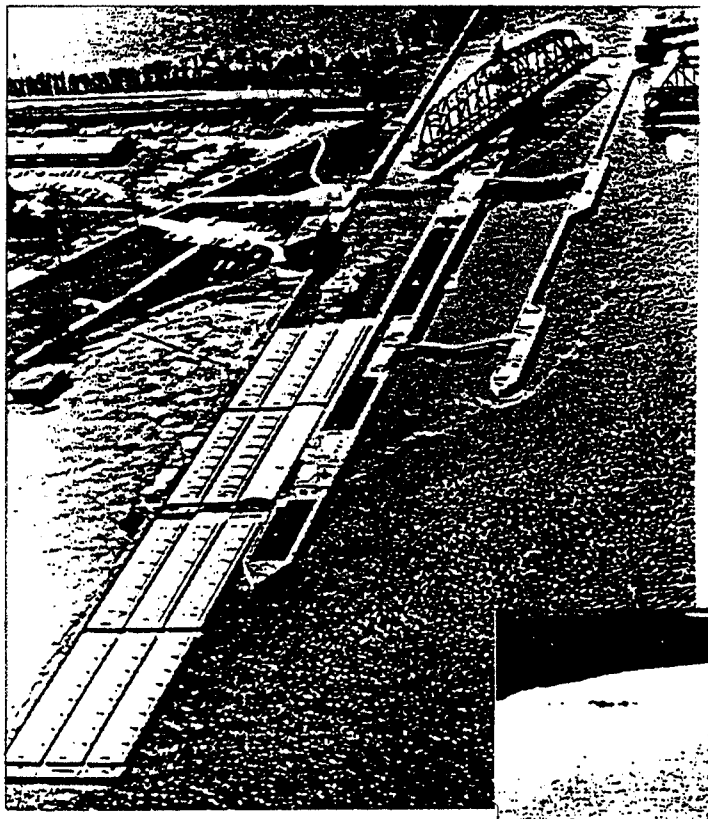

Figure 2.1. Twelve-barge tow reassembled after double lockage, Lock and Dam 15, Upper Mississippi River. (Rock Island *Argus*)

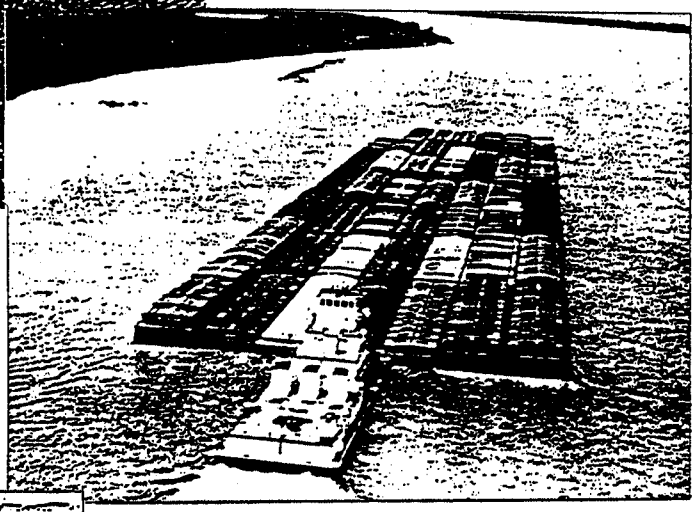

Figure 2.2. Forty-eight-barge tow, Lower Mississippi River (U.S. Army, Corps of Engineers, Vicksburg District)

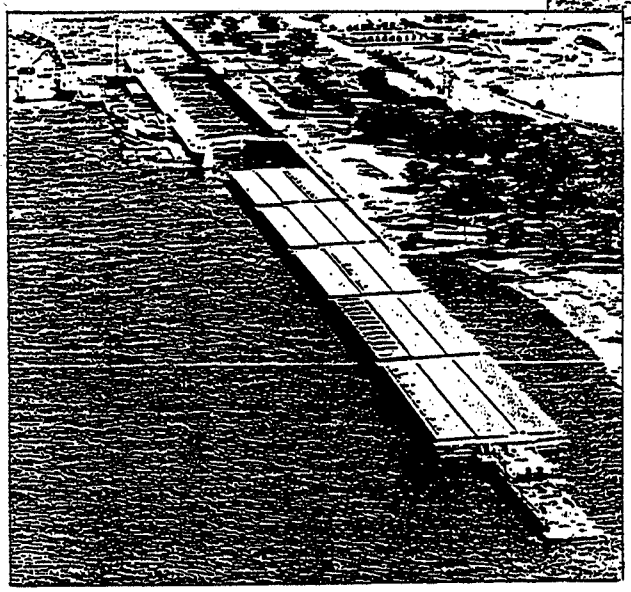

Figure 2.3. Fifteen-barge tow approaching Lock and Dam 22, Upper Mississippi River (U.S. Army, Corps of Engineers, Rock Island District,)